SM20-605628

2020 Fish Habitat Assessments for Lake Babine Nations in the Granisle Area

Prepared for:
Capacity Forest Management Ltd.
1761 Redwood St.
Campbell River, BC, V9W 3K7

Prepared by:
Mac Jedrzejczyk, M.Sc., R.P.Bio.
FINS Consulting Ltd.
4206 Eby St.
Terrace, BC, V8G 2E5

November 2020

Table of Contents

List of Figures

List of Tables

1 Introduction

In May 2020, FINS Consulting Ltd. (FINS) was retained by Capacity Forest Management Ltd. (CapFor) to assess fish habitat and establish fish presence/absence in select streams for Babine Lake Nations in the Granisle general Area. The overall purpose of the assessments was to determine fish presence/absence and evaluate fish habitat to assign streams' riparian classifications and alleviate forest management activities.

Fieldwork took place from July 5 – 10, 2020.

2 Location and Access to Project Areas

Project areas (Figure 1) are located approximately 18 km NNW and 13 km SSE of Granisle, respectively.

Both areas were reached by 4X4 vehicle while specific stream reaches for assessment were accessed on foot.

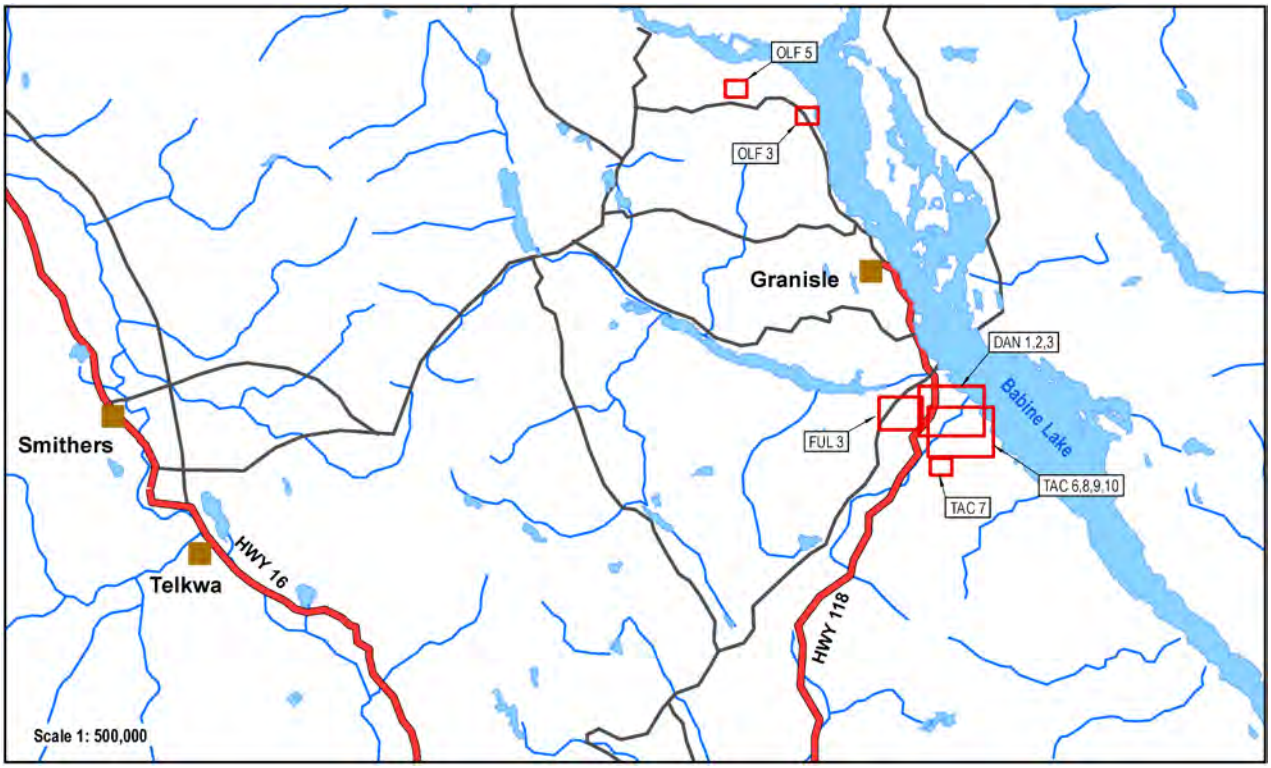


Figure 1: Location of Project Areas.

3 Methods

The methodology used throughout this project was consistent with the standards and methods outlined in the following publications:

- Reconnaissance (1:20,000) Fish and Fish Habitat Inventory: Standards and Procedures. Version 2.0. (RIC, 2001)
- Fish-stream Identification Guidebook, Second Edition (FSID) (FPC, 1998)
- Riparian Management Area Guidebook (FPC, 1995)
- Modernized Fisheries Act (FA, 2019)

Areas of interest requiring stream assessments were identified by CapFor personnel before the field trip.

3.1 Review of Existing Fisheries Information

Assessed streams are within the Babine Lake (BABL) high-level watershed group in the Skeena Region.

The unnamed stream (watershed code (WSC) 480-575000) coho salmon (CO)(*Oncorhynchus kisutch),* cutthroat trout (CT)(*O. clarki*), Dolly Varden char (DV)(*Salvelinus malma*), and rainbow trout (RB) (*O. mykiss*) presence was documented by Triton Environmental Consultants Ltd. (Triton) through Reconnaissance (1:20,000) Fish and Fish Habitat Inventory of Unnamed Tributaries to Babine Lake (Smithers Landing Planning Area) completed in the year 2000. No fish was captured in its tributary -575000-22400 in a few sampled reaches and in Reach 2 of stream 480-612957 in the same project.

The unnamed stream (WSC 480-697200-02900) was a part of two stream assessment projects in 2001 and 2009 completed by Triton. During the Reconnaissance (1:20,000) Fish and Fish Habitat Inventory of Selected Tributaries to the South Side of the Fulton River Watershed in 2001, RB presence was inferred in Reach 3. However, RB was captured in the same creek in Reach 2 during North Road Fish Passage Culvert Assessments conducted in 2009.

In 2001 Triton also assessed numerous streams during Reconnaissance (1:20,000) Fish and Fish Habitat Inventory of Unnamed Tributaries to the Southwest Shore of Babine Lake, South of Topley Landing.

Tachek Creek (480-705800) contained populations of sculpin species (CC) *(Cottus spp.)*, sockeye salmon (SK) *(O. nerka)*, kokanee (KO) *(O. nerka)*, mountain whitefish (MW) *(Prosopium williamsoni),* CO, and RB.

CT was captured in its tributary -705800-06200 at the outlet of Timber Lake (01236BABL) and in stream 480-718600.

3.2 Air Photo Interpretation

Air photo/orthophoto interpretation (API) was completed to:

- delineate stream reaches for all drainages where reaches were missing,
- identify potential barriers to fish migration, which would be later verified in the field,
- assess if potential overwintering habitat is present above these obstructions.

During the API process of an unnamed stream (480-697200-02900), the wetland in Reach 8 was selected for field investigation as a potential barrier to fish passage due to the lack of a visible channel in its southern portion.

A very confined gully was also identified in the lower section of Reach 1 in stream 480-575000-22400. This finding suggested a high likelihood of an existing fish barrier, which could explain a reason for fish absence in four sampling sites upstream.

3.3 Stream Data Collection

Stream data were collected on Site Cards and Fish Collection Forms. These field cards are the currently accepted method of collecting data for stream evaluation. Printouts of all field data collected are provided in Appendix I. Abbreviations used in the Site Data Forms are provided in the List of Abbreviations on page 14.

3.4 Fish Sampling

During the assessments, electrofishing supplemented by visual observation of fish movement was employed as the methods used for fish sampling.

3.5 Measurements and Calculations

Stream channel and wetted widths were determined using a meter tape. Generally, a minimum of six channel width (CW) measurements were made within the site vicinity at a distance of approximately 15-20 m apart and were rounded to two decimal places. In cases where the channel was close to riparian class boundaries (i.e. 1.5m, 3m, etc.), more measurements at equal spacing were taken to determine a precise location of transition between riparian classes. Stream depth measurements were determined using a meter stick or were estimated if the channel was inaccessible due to treacherous conditions. Stream gradient measurements were determined using the Abney level along several sections of the site and were rounded to a full number. In some instances, where the stream slope was close to 0%, the level readings were rounded to 0.5% to indicate flowing water. Site lengths were determined using a professional GPS unit or GIS software during mapping. Stream water temperatures, conductivity, and pH were determined using a portable Hanna water chemistry multi-meter, calibrated using standardized solutions. Water velocities for the velocity barrier were calculated using a modified Manning formula. Roughness coefficients were derived from Manning's and Cowan's coefficients (McCuen, R. H., 1989), which were adjusted by analyzing stream morphology data collected by FINS during

the past 25 years. Heights and lengths of linear obstructions (cascades, velocity barriers, etc.) were determined using a meter tape and Abney level and then applying slope/distance tables to verify the vertical height.

3.6 GPS Recording

The location of existing drainages, survey sites, and any important features affecting fish habitat and fish distribution was recorded using professional GPS. All point features were logged for 150 seconds.

Collected raw data were not post-processed.

3.7 Stream and Site Referencing

All watercourses without a gazetted name or watershed code (WSC) were assigned a Temporary Watershed Code (TWC) consisting of five unique digits (known as Interim Location Points (ILP)) - as recommended in the FSID.

Parent streams were identified by a combination of a gazetted name with a WSC or just by a WSC, if available.

Existing and non-existing drainages were then referenced using gazetted names with TWC or a reduced WSC. A reduced WSC contains the last digit group of the parent stream and the last digit group of the watercourse in question.

Site numbers for this project have been assigned in an ascending order based on the survey sequence.

3.8 Photographs

Representative site photographs and any significant site features are presented in Appendix I. A standard field book (20x15 cm), a meter stick (folds every 22 cm), or a person (180 cm tall) were used for scale to reference the size of channel or features in pictures,

Photos have been reduced in size so that multiple images can be presented on one page. Each picture is labelled with a site number and the direction in which the photo was taken.

3.9 Fish Habitat Value

Fish habitat values represent the importance of existing habitat in sustaining a fish population in a specific watershed, as suggested by Fish-stream Crossing Guidebook (Revised Edition, 2012). Abbreviation “CR” indicates critical habitat value, “IM” – important, “MG” – marginal, and “NA” - not applicable, was added to show that there is no fish habitat in a specific stream.

The applicable values for the assessed stream reaches were presented in the “Summary of assessed streams” table in the “Results and Discussion” section to indicate that additional steps in preserving and protecting fish habitat may be warranted during forest management activities.

3.10 Mapping

The mapping convention for this project generally follows the standards as recommended in the FSID Guidebook. GIS software was used to produce three 1:5,000, one 1:10,000, and two 1:15,000 scale maps from shapefiles obtained from the BC Land and Resource Data Warehouse or created in the office from orthophoto interpretation. Maps are included in Appendix II at the end of this report.

Project maps depict: current and any pertinent earlier site information, barriers to fish migration, evaluated streams with an indication of their fish status and classification, sections of assessed streams, TRIM2 stream network, existing fish observation points, road network, and basic topographic features. This information is presented using unique symbols, which are explained in the map's legend.

3.11 Field Equipment

All field equipment used is listed below:

- GPS unit Ashtech MM100
- 1 Hanna water chemistry multi-meter
- 1 Abney level, Silva compass
- 1 Pentax Optio W80 digital camera
- 14 G type minnow traps
- Dip net
- assorted fish sampling equipment (measuring trough, fish anesthetic, collapsible bucket, fish bait, safety equipment)
- various other equipment including meter tape and meter stick
- personal First Aid kits, as per WorkSafe BC requirements
- satellite telephone

4 Results

The following tables within sections 4.1 and 4.2 summarize all surveyed reaches, and present information for all non-fish bearing reaches. Both tables are sorted alphabetically by the area where assessments took place to ease a specific assessment search.

The first, "Summary of all assessed reaches", provides basic physical information and brief comments for all surveyed reaches.

The second, "Summary of non-fish bearing reaches", provides justifications for all non-fish bearing reaches and includes pertinent physical site-specific data, sampling method and effort, relevant historical information, and comments that provide a rationale to support derived riparian classification for non-fish bearing watercourses.

Site details can be found in the field forms in Appendix I.

4.1 Summary of all Assessed Reaches

In the table, the symbol "*" in all columns indicates that no data were collected. In the column "Habitat Value Rating," the abbreviation "NA" indicates that a riparian classification does not apply to non-fish bearing reaches, "MG" – marginal habitat, and "IM" – important habitat. In the column "Sampling Results," "NS" means that fish sampling was not performed; "(RB)" indicates the inferred presence of rainbow trout and "NFC" that no fish were captured during fish sampling.

Table 1: Summary of assessed reaches.

AREA	Stream ID (Name, TWC or WSC)	Reach #	Site #	UTM zone	UTM Easting	UTM Northing	Riparian Class	Habitat Value Rating	Channel Slope (%)	Channel Width (m)	Channel Depth(m)	Sampling Results	Site Length (m)	Follow-up Sampling	Comments
DAN001	480-704490	2	1	9	685417	6075204	S6	NA	1	1.73	0.40	NFC	900	N	Confirmed non-fish bearing - see NFB report.
	480-705800	1.1 & 1.2	3	9	685259	6075293	S3	IM	1	3.67	*	CO	1600	N	The right bank of Tachek Creek was breached several years ago at UTM 9.684665.6074965 (~100 m d/s of the bridge). Currently, this new distributary dissects proposed blocks DAN001. It carries ~25% of the Tachek C. flow and is still in the process of forming a channel. It is characterized by mostly overland flows with some sections scoured and channelized, occasionally water floods ~40-50m wide valley. CO was captured d/s of wetland where the confluence of stream 480-704490 is located. It was impossible to obtain full channel measurements or determine complete morphology due to flooding and continuing channel formation; therefore, the channel width was estimated. Numerous BDs were observed in ~300m section u/s of Babine L. Another forming distributary (branch) flowing South was noted ~250m u/s of Babine Lake at UTM 9.686059.6075433 (the east side of DAN001). When completely established in the near future, both branches will create good rearing and overwintering habitat for CO fry.
DAN002, DAN003	480-705800-06053	1	2	9	684646	6075401	NCD	NA	*	*	*	NFC	350	N	Not a stream - see NFB report.
		2					S6	NA	3	1.13	0.27				Confirmed non-fish bearing - see NFB report.
FUL003	480-697200-02900	7	No site	*	*	*	*	*	*	*	*	NS	100	N	The stream is barely channelized in R7, unknown fish use.
		8	8	9	680668	6074641	NCD	NA	*	*	*	NS	250	N	Not a stream - see NFB report.
	480-697200-02900-99586	1 &2	No site	*	*	*	*	NA	*	*	*	NS	*	N	Confirmed non-fish bearing - see NFB report.
	480-697200-02900-99586-3070	1 &2	No site	*	*	*	*	NA	*	*	*	NS	*	N	Confirmed non-fish bearing - see NFB report.
	480-697200-02900-99586-3070-1711	1 &2	No site	*	*	*	*	NA	*	*	*	NS	*	N	Confirmed non-fish bearing - see NFB report.

Table 1: Summary of assessed reaches.

AREA	Stream ID (Name, TWC or WSC)	Reach #	Site #	UTM zone	UTM Easting	UTM Northing	Riparian Class	Habitat Value Rating	Channel Slope (%)	Channel Width (m)	Channel Depth(m)	Sampling Results	Site Length (m)	Follow-up Sampling	Comments
OLF003	480-612957	1	9	9	672299	6097541	S6	NA	13	1.38	0.12	NS	800	N	Confirmed non-fish bearing - see NFB report.
OLF005	480-575000-22400	1	10	9	665666	6099961	S3	MG	6	3.50	0.50	RB	350	N	A seasonal stream with use limited to approximately two months of the year as indicated by algae coatings on the stream bed substrate. Numerous sediment wedges impede access to fish. No spawning habitat was observed; the stream is too steep and has a too short watered period for fry to develop. The stream is too shallow for overwintering. Fish presence is sparse and only was captured near the mouth. The stream is relatively volatile during high flows as indicated by parallel large woody debris, mid-channel bars, and sediment wedges.
TAC006	480-705800-10302	1	7	9	683113	6072289	NCD	NA	*	*	*	NS	300	N	Not a stream - see NFB report.
	480-704490	4 & 5	No site	*	*	*	*	NA	*	*	*	NS	*	N	Confirmed non-fish bearing - see NFB report.
	480-704490-87241	1	No site	*	*	*	*	NA	*	*	*	NS	*	N	Confirmed non-fish bearing - see NFB report.
TAC007	480-718600	4	5	9	684091	6071294	S3	MG	2	2.00	0.40	RB	1000	N	Overall good rearing habitat for RB, but stream lacks deep pools. No spawning habitat present - mostly fines with a few surface gravel deposits. No suitable overwintering pools were observed other than beaver ponds, which may be too shallow. Stream with several BDs in the upper 300 m of reach impeding RB access. Some BDs breached with the flow away from the original channel.
		5					S3	MG	*	<5 m	*	NFC (RB)		N	Numerous BDs temporarily obstruct RB access through the entire reach.
		6.1	4	9	683161	6070601	S3	MG	2	1.87	0.33	NFC (RB)	700	N	Stream with only usable rearing habitat d/s of velocity barrier (UTM 9.682926.6070433), but beaver dams in R4 and R5 temporarily obstruct the fish use. No spawning or overwintering habitat was observed. The start of the barrier marks the upper RB distribution and transition between fish-bearing and non-fish bearing reach.
		6.2					S6	NA	2	1.50	*	NFC		N	Confirmed non-fish bearing - see NFB report.
TAC008	480-718600-18048	1	No site	*	*	*	S4	MG	3	0.70	*	NFC	1200	N	The stream was traversed from the mouth, and it is accessible to CT or RB from the parent stream (stream 480-718600). The inlet of 600 mm CMP at the existing crossing is completely buried and blocks fish access to upper reaches (UTM 9.686596.6073256).
		2	6	9	686298	6073386	S4	MG	3	1.05	0.27	NS		N	Stream with usable habitat for RB or CT; however, no spawning or overwintering habitat was observed. The culvert blocks access to the reach at the road crossing. The stream is potentially accessible from the parent stream but becomes NCD at UTM 9.686094.6073533. The start of NCD marks the upper CT or RB distribution and transition between fish-bearing and non-fish bearing reach.
		2	6				NCD	NA	*	*	*	NS		N	Not a stream - see NFB report.

Table 1: Summary of assessed reaches.

AREA	Stream ID (Name, TWC or WSC)	Reach #	Site #	UTM zone	UTM Easting	UTM Northing	Riparian Class	Habitat Value Rating	Channel Slope (%)	Channel Width (m)	Channel Depth(m)	Sampling Results	Site Length (m)	Follow-up Sampling	Comments
TAC009	Tachek C. 480-705800	5	No site	*	*	*	*	*	*	*	*	NS	*	N	Numerous fish species presence is historically documented in the stream.
	480-705800-06200	1	No site	*	*	*	*	*	*	*	*	NS	*	N	CT presence was documented u/s at the Timber Lake outlet by Triton in 2001.
TAC010	480-704490	4	No site	*	*	*	*	NA	*	*	*	NS	*	N	Confirmed non-fish bearing - see NFB report.

4.2 Non-fish Bearing Report

In the table, the symbol "*" in all columns indicates that no data were collected. In the column "Flow Stage" the abbreviation "L" means that the flow was in low levels (< 30% of bankfull), and "M" that flow was in moderate levels (30 – 80% of bankfull). In the column "Turbidity," the abbreviation "C" indicates that water was clear during assessments, and "M" that water was moderately turbid. In the column "Sampling Results," "NS" means that no fish sampling was performed.

Table 2: Summary of the non-fish bearing reaches.

Area	Stream ID (Name, TWC or WSC)	Reach #	Site #	Date	Riparian Class	Channel Slope (%)	Channel Width (m)	Channel Depth (m)	Flow Stage	Water Temperature (°C)	Conductivity (µS/cm)	Turbidity	Sampling Method	Sampling Results	Effort (EF - sec/ dist.; MT #/Hrs)	EF Specs (V/ Hz/ µs)	Comments
DAN001	480-704490	2	1	5-Jul-20	S6	1.00	1.73	0.40	M	12.2	147	C	EF	NFC	366/ 250	500 /90 /6	No fish habitat - the stream is isolated above an open water wetland in R1 and has seasonal flows, as reported by Triton in 2001. The channel is barely distinguishable through the upper portion of the wetland. This section is shallow and full of organic material, which causes oxygen depletion through decomposition. Methane bubbles were released after gentle probing of the bottom. The film of natural carbohydrates was present in stagnant water, which also indicates the depletion of oxygen. Such conditions create an unusable habitat for any sport fish and make this section impassable to fish. No isolated fish population is present above the habitat barrier as the stream does not contain perennial habitat upstream.
DAN002 DAN003	480-705800-06053	1	2	6-Jul-20	NCD	*	*	*	L	11.4	260	C	EF	NFC	58/ 100	300 /80 /4	No fish habitat - the watercourse is inaccessible to fish from Tachek Creek. There is no channel through the shallow wetland, which is vegetated by dense aquatic plants. ~50 m outflow section is a seasonal overland flow through ~ 5 m wide flat swale with barely visible surface scour. Unusable habitat for fish.
		2			S6	3	1.13	0.27									No fish habitat - tiny stream with no perennial fish habitat to support any isolated fish population. It is inaccessible to fish from Tachek Creek due to lack of channel through Reach 1.
FUL003	480-697200-02900	8	8	9-Jul-20	NCD	*	*	*	*	*	*	*	NS	*	*	*	No fish habitat - no channel through bog was observed u/s from the point UTM 9.680668.6074641, and there is no access to fish from the lake downstream. The watershed upstream of the site is too small and has no lakes to provide perennial fish habitat for any isolated population.
	480-697200-02900-99586	1 &2	No site	9-Jul-20	*	*	*	*	*	*	*	*	NS	*	*	*	No fish habitat - the watercourse flows to the confirmed NFB reaches d/s and has no lakes to support any isolated fish population.

Table 2: Summary of the non-fish bearing reaches.

Area	Stream ID (Name, TWC or WSC)	Reach #	Site #	Date	Riparian Class	Channel Slope (%)	Channel Width (m)	Channel Depth (m)	Flow Stage	Water Temperature (°C)	Conductivity (µS/cm)	Turbidity	Sampling Method	Sampling Results	Effort (EF - sec/ dist.; MT #/Hrs)	EF Specs (V/ Hz/ µs)	Comments
FUL003	480-697200-02900-99586-3070	1 &2	No site	9-Jul-20	*	*	*	*	*	*	*	*	NS	*	*	*	No fish habitat - the watercourse flows to the confirmed NFB reaches d/s and has no lakes to support any isolated fish population.
	480-697200-02900-99586-3070-1711	1 &2	No site	9-Jul-20	*	*	*	*	*	*	*	*	NS	*	*	*	No fish habitat - the watercourse flows to the confirmed NFB reaches d/s and has no lakes to support any isolated fish population.
OLF003	480-612957	1	9	7-Jul-20	S6	13	1.38	0.12	L	9.9	126	C	NS	*	*	*	No fish habitat - shallow stream with no perennial habitat to support any isolated fish population. It is inaccessible to fish from Babine Lake due to dissipation into the ground at UTM 9.672299.6097541 (40 m away from the lake). No fish was captured by Triton in 2000 in Reach 2 upstream.
TAC006	480-705800-10302	1	7	9-Jul-20	NCD	*	*	*	*	10.8	98	*	NS	*	*	*	No fish habitat - the watercourse flows through a swampy swale approximately 15-25 m wide. It is characterized by mostly overland flows and puddling with no scoured channel or alluvium present over the 300 m of surveyed length.
	480-704490	4 & 5	No site	5-Jul-20	*	*	*	*	*	*	*	*	NS	*	*	*	No fish habitat - the watercourse flows to the confirmed NFB reaches d/s and has no lakes to support any isolated fish population.
	480-704490-87241	1	No site	5-Jul-20	*	*	*	*	*	*	*	*	NS	*	*	*	No fish habitat - the watercourse flows to the confirmed NFB reaches d/s and has no lakes to support any isolated fish population.
TAC007	480-718600	6.2	4	7-Jul-20	S6	2	1.50	*	M	8.1	124	C	EF	NFC	596/ 700	500 /90 /4	No fish habitat - the stream is inaccessible to juvenile fish due to a 45 m long and 5 m high-velocity barrier located at UTM 9.682926.6070433. The barrier has a calculated water velocity of 3.9 m/s and is barely passable to the adult RB. However, u/s of the barrier, there is no suitable habitat for adult RB due to the lack of spawning and overwintering habitat.
TAC008	480-718600-18048	2	6	8-Jul-20	NCD	*	*	*	L	10.6	182	C	NS	*	*	*	No fish habitat - the stream becomes NCD at UTM 9.686094.6073533. No continuous scoured channel was observed upstream of this point. The watercourse is composed of mostly overland flows through approx. 10 m wide swampy swale with terrestrial and aquatic plants. The length of a continuously scoured channel was no greater than 30 m above the coordinates.
TAC010	480-704490	4	No site	5-Jul-20	*	*	*	*	*	*	*	*	NS	*	*	*	No fish habitat - the watercourse flows to the confirmed NFB reaches d/s and has no lakes to support any isolated fish population.

5 List of Abbreviations

REPORT

C	Clear (turbidity)	MT	Minnow trap
dist.	Distance	NA	Not applicable
EF	Electrofishing	NCD	Not Classified Drainage
FPC	Forest Practices Code	RIC	Resource Inventory Committee
FRPA	Forest and Range Practices Act	S1 - S6	Riparian classes (streams)
FSID	Fish-stream Identification Guidebook	sec	seconds
GIS	Geographic Information System	TRIM	Terrain Resource Information Management
GPS	Global Positioning System	TWC	Temporary Watershed Code
Hz	Hertz	UTM	Universal Transverse Mercator
ID	Identifier	V	Volts
IM	Important Fish Habitat Value Rating	WBID	Waterbody Identifier
m	meter	WSC	Watershed Code
M	Moderately turbid	°C	Degree Celsius
MG	Marginal Fish Habitat Value Rating	**µS**	micro Siemens

SITE DATA FORM

SITE REFERENCE	FT - foot, GIS - Geographic Information System, GP2 – GPS unit with differential correction, Lg - length, TWC - Temporary Watershed Code, UTM – Universal Transverse Mercator, V4 – 4x4 vehicle, WSC - Watershed Code, ZEN - Zone. Easting. Northing
CHANNEL MEASUREMENTS	Avg – average, Chan. – channel, Dp – depth, DW – dewatered, H – high, INT – intermittent, L – low, m – meter, M – moderate, NVC – no visible channel, Res. – residual
WATER	C – clear water, Cond – conductivity in micro Siemens, L – low turbidity, M – moderately turbid, pH – acidity (<7) or alkalinity (>7), T – turbid water, Temp – temperature in ° Celsius
COVER	Cover Total: A – abundant, B – boulder cover, CB – cutbanks, D – dominant, DP – deep pools, IV – instream vegetation, LWD – large woody debris, M – moderate, N – none, OV – overstream vegetation, S – sub-dominant, SWD – small woody debris, T – trace Banks: LB – left bank, O – overhanging, RB – right bank, S – sloping, U – undercut, V – v-shaped Bank texture: A – anthropomorphic, B – boulders, C – cobbles, F - fines, G – gravels, R – bedrock Riparian vegetation: C – coniferous, D – deciduous, G – grasses, M – mixed C and D, N – none, S – shrubs, W – wetland Riparian Vegetation Stage: INIT – initial, MF – mature forest, NA – not applicable, PS – pole sapling, SHR – shrub, YF – young forest LWD Function & Distr (Distribution): A/C – abundant and clumped, A/E – abundant and even, F/C – few and clumped, F/E – few and even, N – none IV Type: A – algae, M – mosses, N – none, V – vascular.
MORPHOLOGY	Stream Bed Substrate: B – boulders, C – cobbles, D – largest movable particle, Dom – dominant, D95 – largest 5% of particles, F - fines, G – gravels, NA – not applicable, R – bedrock, Subdom – sub-dominant, Substr – substrate Channel Morphology: CP – cascade-pool, CPb – cascade-pool with boulders, CPcw – cascade-pool with cobbles and functioning LWD, LC – large channel (≥100 particles per channel width), RP – riffle-pool, RPcw – riffle-pool with cobbles and functioning LWD, RPgw - riffle-pool with gravels and functioning LWD, SP – step-pool, SPb – step-pool with boulders, SPbw – step-pool with boulders and functioning LWD, SPr – step-pool through bedrock StrmPatt (Stream pattern): IM – irregular meandering, IR – irregular wandering, ME – regular meandering, SI – sinuous, ST – straight, TM – tortuous meandering Confnmnt (Confinement): CO – confined, EN – entrenched, FC – frequently confined, NA – not applicable, OC – occasionally confined, UN - unconfined Coupling: CO – coupled, DC – decoupled, PC – partially coupled Islands: AN – anastomosing, F – frequent, I – irregular, N – none, O – occasional, S – split Bars: BR – braided, DIAG – diagonal, MID – mid-stream, N – none, SIDE – intermittent along the channel, SPAN – continuous along the channel Disturbance Indicators (most common): B2 – eroded banks, C1 – extensive riffles, C2 – no pools, C3 – elevated mid-channel bars, C4 – multi-channels, D2 – parallel logs, O1 – beaver dams, S3 – frequent sediment wedges
FEATURES (most common)	BD – beaver dam, C – cascades/chute, CN – canyon, CV – culvert, F – waterfall, FLD – dewatering, FSB – subsurface flow/ dissipation/ dispersion, H – height, L – length, SP – spring, U – undefined obstruction, UC – underground channel (conduit), VB – velocity barrier, X – log jam, XW – sediment wedge
SAMPLING (most common)	BB – burbot, BMC – brassy minnow, BT – bull trout or bottom habitat, CSU – largescale (ccoarsescale) sucker, CT – cutthroat trout, CO – coho, d – days, DN – dip netting, DV – Dolly Varden, EB – eastern brook trout, EF – electrofishing, freq – frequency, h – hours, Hab – habitat, KO – kokanee, LKC – lake chub, LNC – longnose dace, LSU – longnose sucker, Max L – maximum length, MD – midwater, min – minutes, Min L – minimum length, MT – minnow trap, MW – mountain whitefish, NFC – no fish capture, NFP – no fish present, NS – not sampled, NSC – northern pike minnow, O – other, PCC – peamouth chub, PS – pole seining, R – rearing, RB – rainbow trout, RSC – redside shiner, S – spawning, Samp L – sampling length, sec – seconds, SK – sockeye, SP – species unidentified, ST – steelhead, SU – suckers or surface habitat, TR – trout unknown, VO – visual observation, VR – variable, WSU – white sucker

6 References

Data BC, Geographic Data Discovery Service website (https://apps.gov.bc.ca/pub/geometadata/)

Ecological Reports Catalogue website (http://www.env.gov.bc.ca/ecocat/)

Fish Inventories Data Queries website (http://a100.gov.bc.ca/pub/fidq/)

Habitat Wizard website (http://www.env.gov.bc.ca/habwiz/)

iMap BC website (http://maps.gov.bc.ca/ess/sv/imapbc/)

McCuen, R.H., 1989. Hydrologic Analysis and Design. Prentice Hall, Englewood Cliffs, NJ, 867 pp.

Province of British Columbia. 1995. Riparian Management Area Guidebook. Forest Practices Code Guidebook. BC Min. For., Victoria, B.C.

Province of British Columbia. 1997. Fish Collection Methods and Standards. Version 4.0. RIC January 1997 and Errata #1 RIC (March 1999). BC Min. Fisheries. Fisheries Inventory Section. Victoria, B.C.

Province of British Columbia. 1997. Fisheries Information Summary System (FISS): Data Compilation and Mapping Procedures. Federal/ Provincial Fish Habitat Inventory and Information Program. Draft 3 October 1997. BC Min. Fisheries. Fisheries Inventory Section. Victoria, B.C.

Province of British Columbia. 1998. Fish-stream Identification Guidebook Second Edition. Forest Practices Code Guidebook. BC Min. For., Victoria, B.C.

Province of British Columbia. 1999. Reconnaissance (1:20,000) Fish and Fish Habitat Inventory: Site Card Field Guide. Version 1.0. RIC March 1999 and Errata RIC (March 2000). BC Min. Fisheries. Fisheries Inventory Section. Victoria, B.C.

Province of British Columbia. 1999. Reconnaissance (1:20,000) Fish and Fish Habitat Inventory: Fish Collection Form Field Guide. Version 1.0. RIC March 1999 and Errata RIC (March 2000). BC Min. Fisheries. Fisheries Inventory Section. Victoria, B.C.

Province of British Columbia. 2000. Reconnaissance (1:20,000) Fish and Fish Habitat Inventory: Reach Information Guide. Version 1.0. RIC March 2000. BC Min. Fisheries. Fisheries Inventory Section. Victoria, B.C.

Province of British Columbia. 2001. Reconnaissance (1:20,000) Fish and Fish Habitat Inventory: Standards and Procedures. Version 2.0. RIC April 2001. BC Min. Fisheries. Fisheries Inventory Section. Victoria, B.C.

Province of British Columbia. 2001. Standards for Fish and Fish Habitat Maps. Version 3.0. RIC April 2001. BC Min. Fisheries. Fisheries Inventory Section. Victoria, B.C.

Province of British Columbia. 2001. Users Guide to British Columbia's Watershed/ Waterbody Identifier System. Version 2.2. RIC March 2001. BC Min. Fisheries. Fisheries Inventory Section. Victoria, B.C.

Province of British Columbia. 2012. Fish-stream Crossing Guidebook. Revised Edition. BC. Ministry of Forests, Lands and Natural Resource Operations, BC. Ministry of Environment, and Fisheries and Oceans Canada. For. Prac. Invest. Br. Victoria, B.C.

List of Appendices

Appendix I: Site Data Forms and Photos

SITE DATA

2020 Stream Assessment for Lake Babine Nations **Site: 1**

SITE REFERENCE

Gazetted Name: **WSC:** 480-704490 **Map:** 093L.080

Local Name: **TWC:** **Reach:** 2 **Surv Lg** 900 **Access:** FT

UTM Z.E.N: 9 | 685417 | 6075204 **Method:** GP2 **Survey Date:** 05/07/2020 **Time:** 8:30 **Agency:** C016 **Crew:** MJ/SH

CHANNEL

Measurement	1	2	3	4	5	6	7	8	9	10	11	12	Avg:
Channel Width (m):	1.7	2.2	1.8	1.6	1.8	1.3							1.73
Wetted Width (m):	1.5	1.6	1.6	1.1	1.2	1							1.33
Res. Pool Dp (m):	0.15												0.15
Bankfull Depth (m):	0.4	0.4											0.4
Chan. Gradient (%):	1												1

WATER

Temp: 12.2
pH: 6.5
Cond: 147
Turbidity: C

Flow Stage: M **Channel Conditions:** **Flood Signs:** None

COVER

CoverTotal:	SWD	LWD	B	CB	DP	OV	IV
A	S	T	N	T	N	D	N

Canopy: 41-70% **LWD Function & Distr:** F/E **IV Type:** N

LB Shape: V **LB Texture:** F **LB Riparian Vegetation:** S **LB Riparian Vegetation Stage:** NA

RB Shape: V **RB Texture:** F **RB Riparian Vegetation:** S **RB Riparian Vegetation Stage:** NA

CHANNEL MORPHOLOGY

Dom Substrate: F **D95 (cm):** 0.1 **Morphology:** LC **Strm Patt:** IR **Confnmnt:** UN **Coupling:** DC **Islands:** N

Subdom Substr: NA **D (cm):** 0.1 **Bars:** N **Disturbance Indicators:** O1

FEATURES

Feature	H (m)	L (m)	Comment	UTM Z.E.N		

SAMPLING

Method	EF sec	Samp L (m)	EF Volt	EF freq	EF pulse	Traps	Nets	Duration	Depth (m)	Hab
EF	366	250	500	90	6					

Species	Stage	Total #	Min L	Max L	Act	Sampling Comments
NFC						

COMMENTS

Comm 1	No fish habitat - stream is isolated above wetland. Channel is barely distinguishable through wetland.
Comm 2	Shallow and full of organic material which cause oxygen depletion through decomposition. Methane bubbles released after gentle probing of bottom. Film of natural carbohydrates on stagnant water.
Comm 3	Unusable habitat for any sport fish and impassable. No isolated fish population present above habitat barrier.
Comm 4	Stream flows directly to Tachek Creek distributary through wetland.
Comm 5	
Comm 6	
Comm 7	
Comm 8	

Riparian Class: S6

Site 001: view u/s, wetland

Site 001: view d/s, wetland

Site 001: view u/s, channel

Site 001: view d/s, channel

SITE DATA

2020 Stream Assessment for Lake Babine Nations **Site: 2**

SITE REFERENCE

Gazetted Name: **WSC:** 480-705800-0653 **Map:** 093L.090

Local Name: **TWC:** **Reach:** 1 & 2 **Surv Lg** 350 **Access:** FT

UTM Z.E.N: 9 | 684646 | 6075401 **Method:** GP2 **Survey Date:** 06/07/2020 **Time:** 11:00 **Agency:** C016 **Crew:** MJ/SH

CHANNEL

Measurement	1	2	3	4	5	6	7	8	9	10	11	12	Avg:
Channel Width (m):	1.8	0.7	0.7	1.4	1.1	1.1							1.13
Wetted Width (m):	0.8	0.6	0.5	1	1	1							0.82
Res. Pool Dp (m):	0.16												0.16
Bankfull Depth (m):	0.2	0.3	0.3										0.27
Chan. Gradient (%):	3	3											3

WATER

Temp: 11.4
pH: 6.5
Cond: 260
Turbidity: C

Flow Stage: L **Channel Conditions:** **Flood Signs:** None

COVER

CoverTotal:	SWD	LWD	B	CB	DP	OV	IV
A	S	T	T	T	N	D	N

Canopy: 41-70% **LWD Function & Distr:** F/E **IV Type:** N

LB Shape: V **LB Texture:** FB **LB Riparian Vegetation:** S **LB Riparian Vegetation Stage:** NA

RB Shape: U **RB Texture:** FB **RB Riparian Vegetation:** S **RB Riparian Vegetation Stage:** NA

CHANNEL MORPHOLOGY

Dom Substrate: G **D95 (cm):** 25 **Morphology:** RP **Strm Patt:** SI **Confnmnt:** OC **Coupling:** DC **Islands:** N

Subdom Substr: B **D (cm):** 3 **Bars:** N **Disturbance Indicators:** O1

FEATURES

Feature	H (m)	L (m)	Comment	UTM Z.E.N		

SAMPLING

Method	EF sec	Samp L (m)	EF Volt	EF freq	EF pulse	Traps	Nets	Duration	Depth (m)	Hab
EF	58	100	300	80	4					

Species	Stage	Total #	Min L	Max L	Act	Sampling Comments
NFC						Very shallow, not many places where fish could hide.

COMMENTS

Comm 1	No fish habitat - tiny stream with no perennial fish habitat. Inaccessible to fish from Tachek Creek due to lack of channel through wetland and overland flows through wide flat section (approx. 5m) vegetated by aquatic plants.
Comm 2	Wetland is shallow with barely visible surface scour between wetland and Tachek Creek. Unusable habitat for fish.
Comm 3	
Comm 4	
Comm 5	
Comm 6	
Comm 7	
Comm 8	

Riparian Class: S6

Site 002: view d/s, over land flows in wetland

Site 002: view u/s, wetland

Site 002: view d/s, wetland

Site 002: view u/s, wetland ponds

Site 002: view d/s, wetland ponds

Site 002: view u/s, over land flows in wetland

Site 002: view u/s, channel

Site 002: view d/s, channel

SITE DATA

2020 Stream Assessment for Lake Babine Nations **Site: 3**

SITE REFERENCE

Gazetted Name: Tachek C. distributary **WSC:** 480-705800 **Map:** 093L.090

Local Name: **TWC:** **Reach:** 1.1 & 1.2 **Surv Lg** 1600 **Access:** FT

UTM Z.E.N: 9 | 685259 | 6075293 **Method:** GP2 **Survey Date:** 06/07/2020 **Time:** 13:30 **Agency:** C016 **Crew:** MJ/SH

CHANNEL

Measurement	1	2	3	4	5	6	7	8	9	10	11	12	Avg:
Channel Width (m):	4	4	3										3.67
Wetted Width (m):													
Res. Pool Dp (m):													
Bankfull Depth (m):													
Chan. Gradient (%):	1												1

WATER

Temp: 11.8
pH: 6.6
Cond: 70
Turbidity: L

Flow Stage: M **Channel Conditions:** **Flood Signs:** Channel not formed. Flooded valley.

COVER

CoverTotal:	SWD	LWD	B	CB	DP	OV	IV
M	S	T	N	N	D	S	N

Canopy: 21-40% **LWD Function & Distr:** F/E **IV Type:** N

LB Shape: S **LB Texture:** F **LB Riparian Vegetation:** S **LB Riparian Vegetation Stage:** NA

RB Shape: S **RB Texture:** F **RB Riparian Vegetation:** S **RB Riparian Vegetation Stage:** NA

CHANNEL MORPHOLOGY

Dom Substrate: F **D95 (cm):** 12 **Morphology:** RP **Strm Patt:** SI **Confnmnt:** UN **Coupling:** DC **Islands:**

Subdom Substr: G **D (cm):** 12 **Bars:** **Disturbance Indicators:** O1 B3 C4

FEATURES

Feature	H (m)	L (m)	Comment	UTM Z.E.N		

SAMPLING

Method	EF sec	Samp L (m)	EF Volt	EF freq	EF pulse	Traps	Nets	Duration	Depth (m)	Hab
EF	71	300	500	90	6					

Species	Stage	Total #	Min L	Max L	Act	Sampling Comments
CO	F	1	60	60	R	Only sampled within anode range

COMMENTS

Comm 1	Stream breached right bank of Tachek Creek, diverting 1/4 of flow. Stream is still in process of forming a channel.
Comm 2	Mostly over land flows with some sections scoured and channelized. Occasionally flooded ~40-50m wide valley.
Comm 3	CO captured downstream of wetland (Confluence of stream 480-704490).
Comm 4	Measurements estimated. Unable to obtain full channel measurments or determine full morphology due to flooding and continuing channel formation.
Comm 5	Numerous BDs in ~300m section u/s of Babine L.
Comm 6	Another distributary (branch) is flowing S ~250m u/s of Babine L.
Comm 7	
Comm 8	

Riparian Class: S3

Site 003: view across, breached bank of Tachek Creek

Site 003: view across, flooded valley

Site 003: view u/s, channel

Site 003: view d/s, channel and flooding

Site 003: view across, beaver dam near Babine L.

Site 003: view u/s, flooding between BDs near Babine L.

SITE DATA

2020 Stream Assessment for Lake Babine Nations **Site: 4**

SITE REFERENCE

Gazetted Name: **WSC:** 480-718600 **Map:** 093L.080

Local Name: **TWC:** **Reach:** 5 & 6 **Surv Lg** 700 **Access:** FT

UTM Z.E.N: 9 | 683161 | 6070601 **Method:** GP2 **Survey Date:** 07/07/2020 **Time:** 11:20 **Agency:** C016 **Crew:** MJ/SH

CHANNEL

Measurement	1	2	3	4	5	6	7	8	9	10	11	12	Avg:
Channel Width (m):	2.3	1.9	1.5	1.5	2	2							1.87
Wetted Width (m):	2.1	1.8	1.5	1.1	1.7	1.7							1.65
Res. Pool Dp (m):	0.15	0.2	0.34										0.23
Bankfull Depth (m):	0.3	0.4	0.3										0.33
Chan. Gradient (%):	1	2	2	2									1.75

WATER

Temp: 8.1
pH: 6.2
Cond: 124
Turbidity: C

Flow Stage: M **Channel Conditions:** **Flood Signs:** None

COVER

CoverTotal:	SWD	LWD	B	CB	DP	OV	IV
A	S	T	T	D	T	S	N

Canopy: 41-70% **LWD Function & Distr:** F/E **IV Type:** N

LB Shape: U **LB Texture:** FB **LB Riparian Vegetation:** S **LB Riparian Vegetation Stage:** NA

RB Shape: U **RB Texture:** FB **RB Riparian Vegetation:** S **RB Riparian Vegetation Stage:** NA

CHANNEL MORPHOLOGY

Dom Substrate: F **D95 (cm):** 35 **Morphology:** RP **Strm Patt:** IR **Confnmnt:** OC **Coupling:** PC **Islands:** O

Subdom Substr: B **D (cm):** 0.1 **Bars:** SIDE **Disturbance Indicators:**

FEATURES

Feature	H (m)	L (m)	Comment	UTM Z.E.N		
VB	5	45	Water velocity is 3.9m/s thus impassable to juvenile RB and barely passable to adult fish.	9	682926	6070433

SAMPLING

Method	EF sec	Samp L (m)	EF Volt	EF freq	EF pulse	Traps	Nets	Duration	Depth (m)	Hab
EF	596	700	500	90	4					

Species	Stage	Total #	Min L	Max L	Act	Sampling Comments
NFC						

COMMENTS

Comm 1	No fish habitat from start of velocity barrier - no suitable habitat for adult RB u/s . No SHAB or OHAB and impassable to juvenile RB.
Comm 2	Downstream of velocity barrier usable RHAB but temporary obstructed by beaver dams in R4 and R5 (for ~ 150m d/s from upper pond). SHAB - none - mostly fines. OHAB - none - no suitable pools present.
Comm 3	Channel width above velocity barrier estimated to be 1.5m, slope 2%.
Comm 4	
Comm 5	
Comm 6	
Comm 7	
Comm 8	

Riparian Class: S3/S6

Site 004: view u/s, velocity barrier. Narrow and 12% grade

Site 004: view u/s, channel

Site 004: view d/s, channel

SITE DATA

2020 Stream Assessment for Lake Babine Nations **Site: 5**

SITE REFERENCE

Gazetted Name: **WSC:** 480-718600 **Map:** 093L.080

Local Name: **TWC:** **Reach:** 4 **Surv Lg** 1000 **Access:** FT

UTM Z.E.N: 9 | 684091 | 6071294 **Method:** GP2 **Survey Date:** 08/07/2020 **Time:** 10:10 **Agency:** C016 **Crew:** MJ/SH

CHANNEL

Measurement	1	2	3	4	5	6	7	8	9	10	11	12	Avg:
Channel Width (m):	1.5	2	2.5										2
Wetted Width (m):	1.5	2	2.5										2
Res. Pool Dp (m):	0.3												0.3
Bankfull Depth (m):	0.4												0.4
Chan. Gradient (%):	1	4	2										2.33

WATER

Temp: 11.8
pH: 6.8
Cond: 134
Turbidity: C

Flow Stage: M **Channel Conditions:** **Flood Signs:** None

COVER

CoverTotal:	SWD	LWD	B	CB	DP	OV	IV
A	S	T	T	D	N	S	N

Canopy: 41-70% **LWD Function & Distr:** F/E **IV Type:** N

LB Shape: U **LB Texture:** F **LB Riparian Vegetation:** S **LB Riparian Vegetation Stage:** NA

RB Shape: U **RB Texture:** F **RB Riparian Vegetation:** S **RB Riparian Vegetation Stage:** NA

CHANNEL MORPHOLOGY

Dom Substrate: F **D95 (cm):** 50 **Morphology:** RP **Strm Patt:** IR **Confnmnt:** FC **Coupling:** CO **Islands:** O

Subdom Substr: G **D (cm):** 7 **Bars:** N **Disturbance Indicators:** O1 S3

FEATURES

Feature	H (m)	L (m)	Comment	UTM Z.E.N		

SAMPLING

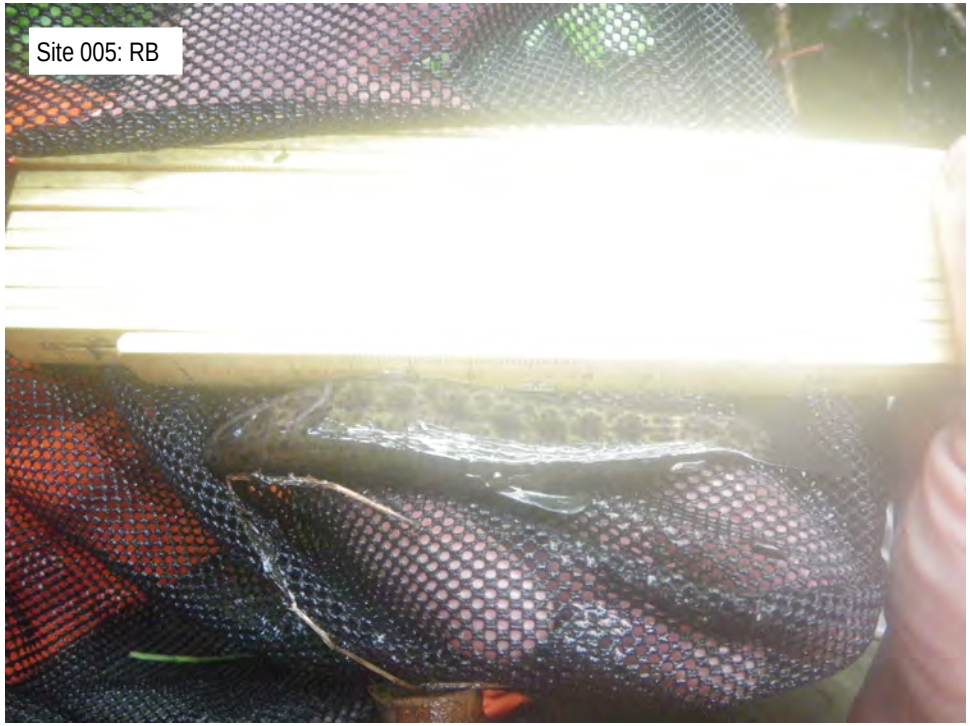
Method	EF sec	Samp L (m)	EF Volt	EF freq	EF pulse	Traps	Nets	Duration	Depth (m)	Hab
EF	116	50	500	90	4					

Species	Stage	Total #	Min L	Max L	Act	Sampling Comments
RB	J	2	101	140	R	

COMMENTS

Comm 1	RHAB - overall good for RB, but stream lacks deep pools.
Comm 2	SHAB - none - mostly fines with a few surface gravel deposits
Comm 3	OHAB - none - no suitable pools observed
Comm 4	Stream with several BDs in the upper 300m of reach; some breached with flow away from the original channel.
Comm 5	
Comm 6	
Comm 7	
Comm 8	

Riparian Class: S3


Site 005: RB


Site 005: view u/s, beaver dam


Site 005: view u/s, channel


Site 005: view d/s, channel

SITE DATA

2020 Stream Assessment for Lake Babine Nations **Site: 6**

SITE REFERENCE

Gazetted Name: **WSC:** 480-718600-18048 **Map:** 093L.080

Local Name: **TWC:** **Reach:** 2 **Surv Lg** 1200 **Access:** FT

UTM Z.E.N: 9 | 686298 | 6073386 **Method:** GP2 **Survey Date:** 08/07/2020 **Time:** 15:30 **Agency:** C016 **Crew:** MJ/SH

CHANNEL

Measurement	1	2	3	4	5	6	7	8	9	10	11	12	Avg:
Channel Width (m):	1	1.2	0.9	1.1	1.1	1							1.05
Wetted Width (m):	0.7	1.1	0.9	1	1	0.8							0.92
Res. Pool Dp (m):	0.1	0.2											0.15
Bankfull Depth (m):	0.3	0.2	0.3										0.27
Chan. Gradient (%):	3	3	3										3

WATER

Temp: 10.6
pH: 6.2
Cond: 182
Turbidity: C

Flow Stage: L **Channel Conditions:** **Flood Signs:** None

COVER

CoverTotal:	SWD	LWD	B	CB	DP	OV	IV
A	S	T	N	S	N	D	N

Canopy: 41-70% **LWD Function & Distr:** F/E **IV Type:** V

LB Shape: V **LB Texture:** F **LB Riparian Vegetation:** S **LB Riparian Vegetation Stage:** NA

RB Shape: V **RB Texture:** F **RB Riparian Vegetation:** S **RB Riparian Vegetation Stage:** NA

CHANNEL MORPHOLOGY

Dom Substrate: F **D95 (cm):** 20 **Morphology:** RP **Strm Patt:** SI **Confnmnt:** OC **Coupling:** DC **Islands:** N

Subdom Substr: G **D (cm):** 6 **Bars:** N **Disturbance Indicators:**

FEATURES

Feature	H (m)	L (m)	Comment	UTM Z.E.N		
CV	0.2	9	CV - buried at inlet, pond at inlet - impassable to fish	9	686596	6073256

SAMPLING

Method	EF sec	Samp L (m)	EF Volt	EF freq	EF pulse	Traps	Nets	Duration	Depth (m)	Hab
NS										

Species	Stage	Total #	Min L	Max L	Act	Sampling Comments

COMMENTS

Comm 1	RHAB - stream with usable habitat for RB or CT
Comm 2	SHAB - none - mix of fines, gravels, and cobbles
Comm 3	OHAB - none - too shallow
Comm 4	Stream is accessible from parent stream but becomes NCD at UTM 9.686094.6073533.
Comm 5	No continuous scourced channel upstream of NCD UTM. Watercourse with mostly over land flows through approx. 10m wide swampy swale with terrestrial and aquatic plants.
Comm 6	Continuously scoured channel no greater than 30m above NCD UTM.
Comm 7	
Comm 8	

Riparian Class: S4/NCD

Site 006: view u/s NCD section

Site 006: view d/s, NCD section

Site 006: view u/s, channelized section

Site 006: view d/s, channelized section


Site 006: pond u/s of culvert


Site 006: culvert outlet


Site 006: culvert inlet

SITE DATA

2020 Stream Assessment for Lake Babine Nations **Site: 7**

SITE REFERENCE

Gazetted Name: **WSC:** 480-705800-10302 **Map:** 093L.080

Local Name: **TWC:** **Reach:** 1 **Surv Lg** 300 **Access:** FT

UTM Z.E.N: 9 | 683113 | 6072289 **Method:** GP2 **Survey Date:** 09/07/2020 **Time:** 10:00 **Agency:** C016 **Crew:** MJ/SH

CHANNEL

Measurement	1	2	3	4	5	6	7	8	9	10	11	12	Avg:
Channel Width (m):													
Wetted Width (m):													
Res. Pool Dp (m):													
Bankfull Depth (m):													
Chan. Gradient (%):													

WATER

Temp:

pH:

Cond:

Turbidity:

Flow Stage: **Channel Conditions:** **Flood Signs:**

COVER

CoverTotal:	SWD	LWD	B	CB	DP	OV	IV

Canopy: **LWD Function & Distr:** **IV Type:**

LB Shape: **LB Texture:** **LB Riparian Vegetation:** **LB Riparian Vegetation Stage:**

RB Shape: **RB Texture:** **RB Riparian Vegetation:** **RB Riparian Vegetation Stage:**

CHANNEL MORPHOLOGY

Dom Substrate: **D95 (cm):** **Morphology:** **Strm Patt:** **Confnmnt:** **Coupling:** **Islands:**

Subdom Substr: **D (cm):** **Bars:** **Disturbance Indicators:**

FEATURES

Feature	H (m)	L (m)	Comment	UTM Z.E.N		

SAMPLING

Method	EF sec	Samp L (m)	EF Volt	EF freq	EF pulse	Traps	Nets	Duration	Depth (m)	Hab
NS										

Species	Stage	Total #	Min L	Max L	Act	Sampling Comments

COMMENTS

Comm 1	No fish habitat - watercourse flows through swampy swale approximately 15-25m wide. Mostly over land flows and puddling with no scoured channel or alluvium present over surveyed length.
Comm 2	Flows in a general direction of 330 degrees. Not a stream as per definition.
Comm 3	
Comm 4	
Comm 5	
Comm 6	
Comm 7	
Comm 8	

Riparian Class: NCD

Site 007: view across, over land flows

Site 007: view d/s, over land flows

Site 007: bed view, over land flows

Site 007: view d/s, puddles

SITE DATA

2020 Stream Assessment for Lake Babine Nations **Site: 8**

SITE REFERENCE

Gazetted Name: **WSC:** 480-697200-02900 **Map:** 093L.080

Local Name: **TWC:** **Reach:** 7 & 8 **Surv Lg** 350 **Access:** FT

UTM Z.E.N: 9 | 680668 | 6074641 **Method:** GP2 **Survey Date:** 09/07/2020 **Time:** 12:50 **Agency:** C016 **Crew:** MJ/SH

CHANNEL

Measurement	1	2	3	4	5	6	7	8	9	10	11	12	Avg:
Channel Width (m):													
Wetted Width (m):													
Res. Pool Dp (m):													
Bankfull Depth (m):													
Chan. Gradient (%):													

WATER

Temp:

pH:

Cond:

Turbidity:

Flow Stage: **Channel Conditions:** **Flood Signs:**

COVER

CoverTotal:	SWD	LWD	B	CB	DP	OV	IV

Canopy: **LWD Function & Distr:** **IV Type:**

LB Shape: **LB Texture:** **LB Riparian Vegetation:** **LB Riparian Vegetation Stage:**

RB Shape: **RB Texture:** **RB Riparian Vegetation:** **RB Riparian Vegetation Stage:**

CHANNEL MORPHOLOGY

Dom Substrate: **D95 (cm):** **Morphology:** **Strm Patt:** **Confnmnt:** **Coupling:** **Islands:**

Subdom Substr: **D (cm):** **Bars:** **Disturbance Indicators:**

FEATURES

Feature	H (m)	L (m)	Comment	UTM Z.E.N		

SAMPLING

Method	EF sec	Samp L (m)	EF Volt	EF freq	EF pulse	Traps	Nets	Duration	Depth (m)	Hab
NS										

Species	Stage	Total #	Min L	Max L	Act	Sampling Comments

COMMENTS

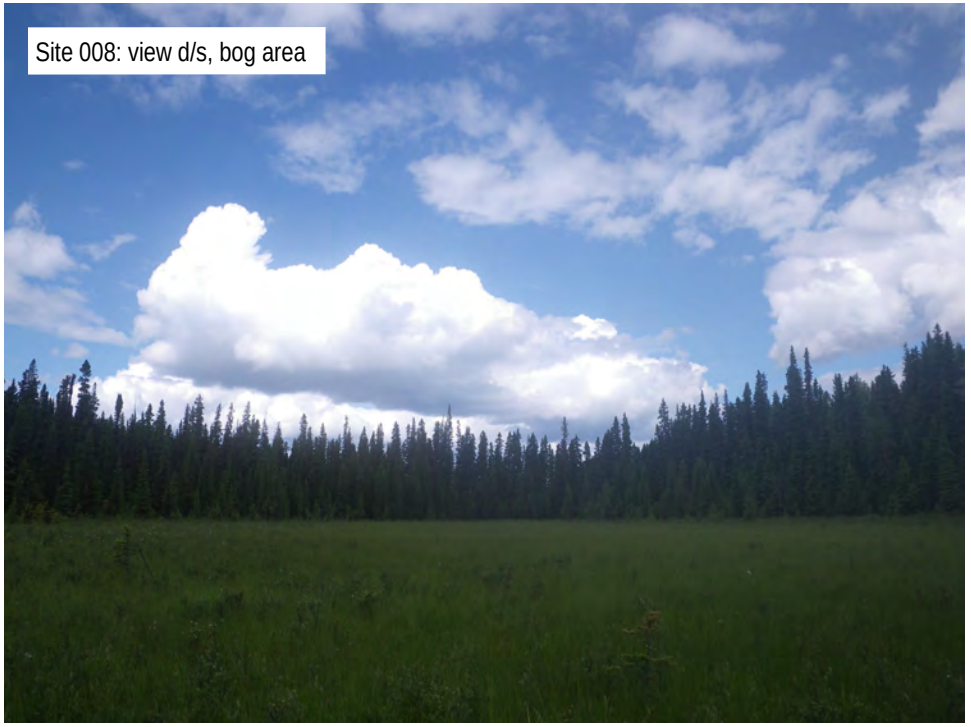
Comm 1	No fish habitat - no channel through bog from the end of dissipation and no access to fish from the lake downstream. Barely channelized in R6 just upstream of the lake.
Comm 2	Watershed upstream of site is too small to provide perennial fish habitat for any isolated population.
Comm 3	
Comm 4	
Comm 5	
Comm 6	
Comm 7	
Comm 8	

Riparian Class: NCD

Site 008: u/s view, “channel” d/s of end of dissipation

Site 008: bed view, vegetation growing in “channel” d/s of end of dissipation

Site 008: u/s view, ground flow



Site 008: view d/s, bog area

SITE DATA

2020 Stream Assessment for Lake Babine Nations **Site: 9**

SITE REFERENCE

Gazetted Name: **WSC:** 480-612957 **Map:** 093L.099

Local Name: **TWC:** **Reach:** 1 **Surv Lg** 800 **Access:** FT

UTM Z.E.N: 9 | 672299 | 6097541 **Method:** GP2 **Survey Date:** 07/07/2020 **Time:** 15:20 **Agency:** C016 **Crew:** MJ/SH

CHANNEL

Measurement	1	2	3	4	5	6	7	8	9	10	11	12	Avg:
Channel Width (m):	1.4	1.1	1.5	1.7	1.1	1.5							1.38
Wetted Width (m):	1	1	0.8	0.7	0.8	1.5							0.97
Res. Pool Dp (m):	0.19												0.19
Bankfull Depth (m):	0.1	0.15	0.1										0.12
Chan. Gradient (%):	12	14	13										13

WATER

Temp: 9.9
pH: 6.4
Cond: 120
Turbidity: C

Flow Stage: L **Channel Conditions:** **Flood Signs:** None

COVER

CoverTotal:	SWD	LWD	B	CB	DP	OV	IV
A	S	T	T	S	N	D	N

Canopy: 41-70% **LWD Function & Distr:** A/E **IV Type:** N

LB Shape: V **LB Texture:** GC **LB Riparian Vegetation:** S **LB Riparian Vegetation Stage:** NA

RB Shape: V **RB Texture:** GC **RB Riparian Vegetation:** S **RB Riparian Vegetation Stage:** NA

CHANNEL MORPHOLOGY

Dom Substrate: G **D95 (cm):** 50 **Morphology:** CP **Strm Patt:** SI **Confnmnt:** CO **Coupling:** CO **Islands:** N

Subdom Substr: C **D (cm):** 13 **Bars:** N **Disturbance Indicators:** B2 C1 S3

FEATURES

Feature	H (m)	L (m)	Comment	UTM Z.E.N		
GF			Stream dissipates 40m away from Babine Lake	9	672299	6097541

SAMPLING

Method	EF sec	Samp L (m)	EF Volt	EF freq	EF pulse	Traps	Nets	Duration	Depth (m)	Hab
NS										

Species	Stage	Total #	Min L	Max L	Act	Sampling Comments

COMMENTS

Comm 1	No fish habitat - shallow stream with no perennial habitat to support any isolated fish population.
Comm 2	Inaccesible to fish due to dissipation into the ground 40m away from the lake.
Comm 3	
Comm 4	
Comm 5	
Comm 6	
Comm 7	
Comm 8	

Riparian Class: S6

Site 009: u/s view, channel

Site 009: d/s view, channel

Site 009: d/s view, start of dissipation

SITE DATA

2020 Stream Assessment for Lake Babine Nations **Site: 10**

SITE REFERENCE

Gazetted Name: **WSC:** 480-575000-22400 **Map:** 093M.008

Local Name: **TWC:** **Reach:** 1 **Surv Lg** 350 **Access:** FT

UTM Z.E.N: 9 | 665666 | 6099961 **Method:** GP2 **Survey Date:** 10/07/2020 **Time:** 11:05 **Agency:** C016 **Crew:** MJ/SH

CHANNEL

Measurement	1	2	3	4	5	6	7	8	9	10	11	12	Avg:
Channel Width (m):	3.5												3.5
Wetted Width (m):	2												2
Res. Pool Dp (m):	0.3	0.3											0.3
Bankfull Depth (m):	0.5												0.5
Chan. Gradient (%):	6												6

WATER

Temp: 9.6
pH: 6.2
Cond: 50
Turbidity: C

Flow Stage: L **Channel Conditions:** **Flood Signs:** None

COVER

CoverTotal:	SWD	LWD	B	CB	DP	OV	IV
A	T	S	T	N	N	D	N

Canopy: 21-40% **LWD Function & Distr:** A/E **IV Type:** M

LB Shape: V **LB Texture:** CB **LB Riparian Vegetation:** C **LB Riparian Vegetation Stage:** MF

RB Shape: V **RB Texture:** CB **RB Riparian Vegetation:** C **RB Riparian Vegetation Stage:** MF

CHANNEL MORPHOLOGY

Dom Substrate: G **D95 (cm):** 50 **Morphology:** CP **Strm Patt:** SI **Confnmnt:** CO **Coupling:** CO **Islands:** O

Subdom Substr: C **D (cm):** 21 **Bars:** SIDE DIAG MID **Disturbance Indicators:** B2 C3 C4 S3

FEATURES

Feature	H (m)	L (m)	Comment	UTM Z.E.N		

SAMPLING

Method	EF sec	Samp L (m)	EF Volt	EF freq	EF pulse	Traps	Nets	Duration	Depth (m)	Hab
EF	353	250	700	90	6					

Species	Stage	Total #	Min L	Max L	Act	Sampling Comments
RB	J	1	66	66	R	Second fish escaped, identified as salmonid
TR	J	1	120	120	R	

COMMENTS

Comm 1	RHAB - seasonal stream with use limited to approximately 2 months of year indicated by algae coatings. Access impeded by numerous sediment wedges.
Comm 2	SHAB - none - too steep, too short period of time for fry to develop.
Comm 3	OHAB - none - too shallow
Comm 4	Channel measumrents the same as those from 2001 Triton survey.
Comm 5	Fish presence sparse, only present near mouth.
Comm 6	Stream is fairly volatile during high flows as indicated by parallel large woody debris and mid bars.
Comm 7	
Comm 8	

Riparian Class: S3

Site 010: u/s view, channel

Site 010: d/s view, channel

Appendix II: Maps

Fish Habitat Assessments for Lake Babine Nations in the Granisle Area

Blocks DAN 001, 002, 003 & TAC009

Scale 1:15,000

Projection: BC Albers
Datum: NAD 83
Coordinates: UTM Zone 9
Field Survey: July 5 - 6, 2020

Inventory and Mapping by: FINS CONSULTING LTD.

LEGEND

- S1 - S4 — Fish Bearing with Riparian Class
- S5 - S6 — Non-fish Bearing with Riparian Class
- NCD
- Other Streams
- Past Assessment
- Current Assessment

Stream Assessment Info (past assessments in purple): Fish Info (Inferred) / NFC(RB) / 1 - 2.3 | S3 (Slope (%), Channel Width (m), Riparian Class (Inferred))

- Site with ID
- TRIT99 — Past Assessment Site with Reference Source and Year
- Stream Reach with ID
- Stream Name 123-456000-78900 — Stream ID (Name and/or WSC and/or TWC)
- Beaver Dam
- Culvert
- VB — Velocity Barrier
- Ground Flow
- Feature Parameters (Height (m), Length (m))
- Highway
- Paved Roads
- Gravel Roads
- 1:20K Map Tile
- 092N.055 — 1:20K Map Tile Label
- 200 — 20 m Contours and 100 m Labels
- 01234ABCD — Proposed Cutblock with ID
- 01234ABCD — Lakes/Rivers with ID
- Wetlands

Abbreviations:

CAS	Prickly sculpin
CC	Sculpin (General)
CO	Coho salmon
CT	Cutthroat trout
FSR	Forest Service Road
KO	Kokanee
MW	Mountain whitefish
NFC	No fish captured
NS	Not sampled
RB	Rainbow trout
SK	Sockeye salmon
TRIT	Triton Environmental Consultants Ltd.
TWC	Temporary Watershed Code
WSC	Watershed Code

Fish Habitat Assessments for Lake Babine Nations in the Granisle Area

Block FUL003

Scale 1:10,000

Projection: BC Albers
Datum: NAD 83
Coordinates: UTM Zone 9
Field Survey: July 9, 2020

Inventory and Mapping by: FINS CONSULTING LTD.

LEGEND

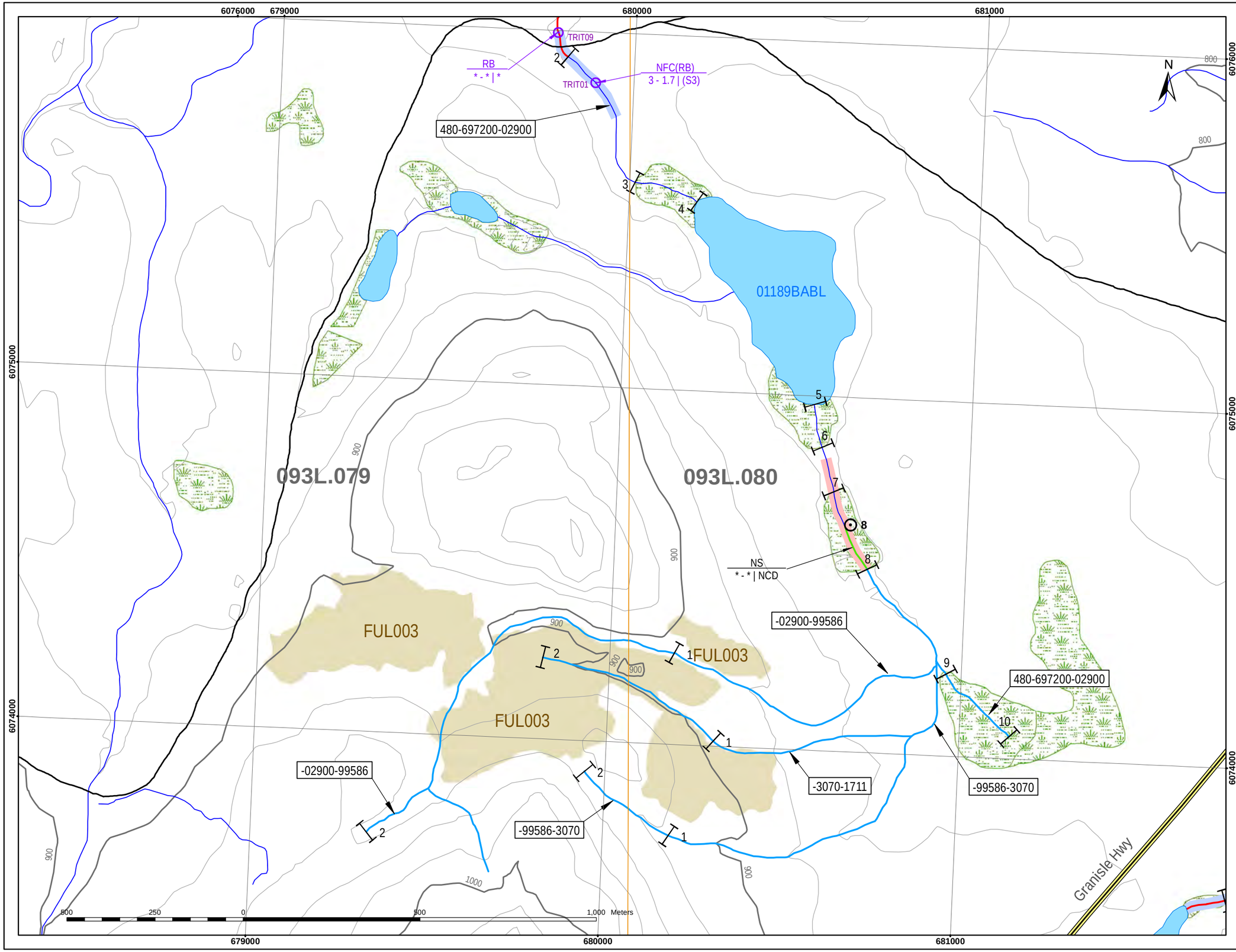
- S1 - S4 — Fish Bearing with Riparian Class
- S5 - S6 — Non-fish Bearing with Riparian Class
- NCD
- Other Streams
- Past Assessment
- Current Assessment

Fish Info (Inferred)
NFC(RB)
1 - 2.3 | S3
(Slope (%), Channel Width (m), Riparian Class (Inferred))
Stream Assessment Info (past assessments in purple)

- Site with ID
- TRIT99 — Past Assessment Site with Reference Source and Year
- Stream Reach with ID
- Stream Name 123-456000-78900 — Stream ID (Name and/or WSC and/or TWC)
- Beaver Dam
- Culvert
- VB — Velocity Barrier
- Ground Flow
- 2 / 30 — Feature Parameters (Height (m), Length (m))
- Highway
- Paved Roads
- Gravel Roads
- 1:20K Map Tile
- 092N.055 — 1:20K Map Tile Label
- 200 — 20 m Contours and 100 m Labels
- 01234ABCD — Proposed Cutblock with ID
- 01234ABCD — Lakes/Rivers with ID
- Wetlands

Abbreviations:

CAS	Prickly sculpin
CC	Sculpin (General)
CO	Coho salmon
CT	Cutthroat trout
FSR	Forest Service Road
KO	Kokanee
MW	Mountain whitefish
NFC	No fish captured
NS	Not sampled
RB	Rainbow trout
SK	Sockeye salmon
TRIT	Triton Environmental Consultants Ltd.
TWC	Temporary Watershed Code
WSC	Watershed Code



Fish Habitat Assessments for Lake Babine Nations in the Granisle Area

Block OLF003

Scale 1:5,000

Projection: BC Albers
Datum: NAD 83
Coordinates: UTM Zone 9
Field Survey: July 9, 2020

Inventory and Mapping by: FINS CONSULTING LTD.

LEGEND

- S1 - S4 — Fish Bearing with Riparian Class
- S5 - S6 — Non-fish Bearing with Riparian Class
- NCD
- Other Streams
- Past Assessment
- Current Assessment

Fish Info (Inferred)
NFC(RB)
1 - 2.3 | S3
Slope (%) | Channel Width (m) | Riparian Class (Inferred)
Stream Assessment Info (past assessments in purple)

Site with ID
TRIT99 Past Assessment Site with Reference Source and Year
Stream Reach with ID
Stream Name 123-456000-78900 Stream ID (Name and/or WSC and/or TWC)
Beaver Dam
Culvert
VB Velocity Barrier
Ground Flow
2 30 Height (m) Length (m) Feature Parameters

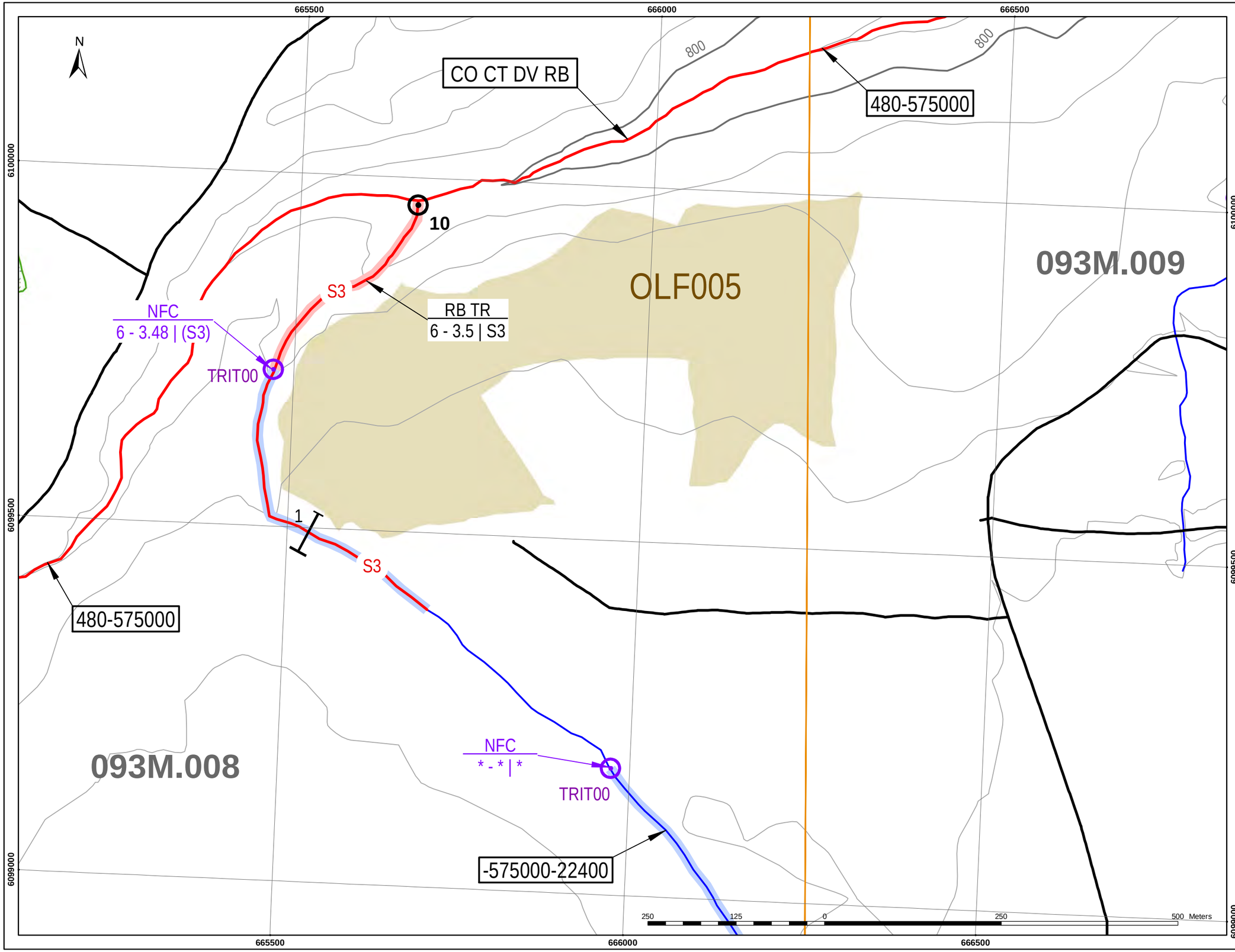
Highway
Paved Roads
Gravel Roads
1:20K Map Tile
092N.055 1:20K Map Tile Label
200 20 m Contours and 100 m Labels

01234ABCD Proposed Cutblock with ID
01234ABCD Lakes/Rivers with ID
Wetlands

Abbreviations:

CAS	Prickly sculpin
CC	Sculpin (General)
CO	Coho salmon
CT	Cutthroat trout
DV	Dolly Varden char
FSR	Forest Service Road
KO	Kokanee
MW	Mountain whitefish
NFC	No fish captured
NS	Not sampled
RB	Rainbow trout
SK	Sockeye salmon
TRIT	Triton Environmental Consultants Ltd.
TWC	Temporary Watershed Code
WSC	Watershed Code

671000 671500 672000 672500
6098000 6097500
N
093M.009
093L.099
OLF003
Babine Lake
00189BABL
800
TRIT00
NFC
1 - 1.08 | (S4)
S6
1
NS
13 - 1.38 | S6
9
480-612957
250 125 0 250 500 Meters



Fish Habitat Assessments for Lake Babine Nations in the Granisle Area

Block OLF005

Scale 1:5,000

Projection: BC Albers
Datum: NAD 83
Coordinates: UTM Zone 9
Field Survey: July 10, 2020

Inventory and Mapping by: FINS CONSULTING LTD.

LEGEND

- S1 - S4 — Fish Bearing with Riparian Class
- S5 - S6 — Non-fish Bearing with Riparian Class
- NCD
- Other Streams
- Past Assessment
- Current Assessment

Fish Info (Inferred)
NFC(RB)
1 - 2.3 | S3
(Slope (%), Channel Width (m), Riparian Class (Inferred))
Stream Assessment Info (past assessments in purple)

- Site with ID
- TRIT99 — Past Assessment Site with Reference Source and Year
- Stream Reach with ID
- Stream Name 123-456000-78900 — Stream ID (Name and/or WSC and/or TWC)
- Beaver Dam
- Culvert
- VB — Velocity Barrier
- Ground Flow
- 2 / 30 — Feature Parameters (Height (m), Length (m))

- Highway
- Paved Roads
- Gravel Roads
- 1:20K Map Tile
- 092N.055 — 1:20K Map Tile Label
- 200 — 20 m Contours and 100 m Labels
- 01234ABCD — Proposed Cutblock with ID
- 01234ABCD — Lakes/Rivers with ID
- Wetlands

Abbreviations:

CAS	Prickly sculpin
CC	Sculpin (General)
CO	Coho salmon
CT	Cutthroat trout
DV	Dolly Varden char
FSR	Forest Service Road
KO	Kokanee
MW	Mountain whitefish
NFC	No fish captured
NS	Not sampled
RB	Rainbow trout
SK	Sockeye salmon
TRIT	Triton Environmental Consultants Ltd.
TWC	Temporary Watershed Code
WSC	Watershed Code

Fish Habitat Assessments for Lake Babine Nations in the Granisle Area

Blocks TAC006, 008, 009, 010

Scale 1:15,000

Projection: BC Albers
Datum: NAD 83
Coordinates: UTM Zone 9
Field Survey: July 8 - 9, 2020

Inventory and Mapping by: FINS CONSULTING LTD.

LEGEND

- S1 - S4 — Fish Bearing with Riparian Class
- S5 - S6 — Non-fish Bearing with Riparian Class
- NCD
- Other Streams
- Past Assessment
- Current Assessment

Fish Info (Inferred)
NFC(RB)
1 - 2.3 | S3
(Slope (%), Channel Width (m), Riparian Class (Inferred))
Stream Assessment Info (past assessments in purple)

- Site with ID
- TRIT99 — Past Assessment Site with Reference Source and Year
- Stream Reach with ID
- Stream Name 123-456000-78900 — Stream ID (Name and/or WSC and/or TWC)
- Beaver Dam
- Culvert
- VB — Velocity Barrier
- Ground Flow
- 2 / 30 (Height (m) / Length (m)) — Feature Parameters
- Highway
- Paved Roads
- Gravel Roads
- 1:20K Map Tile
- 092N.055 — 1:20K Map Tile Label
- 200 — 20 m Contours and 100 m Labels
- 01234ABCD — Proposed Cutblock with ID
- 01234ABCD — Lakes/Rivers with ID
- Wetlands

Abbreviations:

CAS	Prickly sculpin
CC	Sculpin (General)
CO	Coho salmon
CT	Cutthroat trout
DV	Dolly Varden char
FSR	Forest Service Road
KO	Kokanee
MW	Mountain whitefish
NFC	No fish captured
NS	Not sampled
RB	Rainbow trout
SK	Sockeye salmon
TRIT	Triton Environmental Consultants Ltd.
TWC	Temporary Watershed Code
WSC	Watershed Code

683000 684000 685000 686000 687000
6075000 6074000 6073000 6072000
N
500 250 0 500 1,000 Meters

682500 683000 683500 684000

6071000

6070500

682500

N

900

480-718600

RB
2 - 2 | S3

S3

3

5

TAC007

900

4

5

5 VB 45

S6

6.2

6.1

S3

NFC (RB)
2 - 1.87 | S3

NFC
2 - 1.5 | S6

480-718600

250 125 0 250 500 Meters

683000 683500 684000

Fish Habitat Assessments for Lake Babine Nations in the Granisle Area

Block TAC007

Scale 1:5,000

Projection: BC Albers
Datum: NAD 83
Coordinates: UTM Zone 9
Field Survey: July 7 - 8, 2020

Inventory and Mapping by: FINS CONSULTING LTD.

LEGEND

- S1 - S4 — Fish Bearing with Riparian Class
- S5 - S6 — Non-fish Bearing with Riparian Class
- NCD
- Other Streams
- Past Assessment
- Current Assessment

Fish Info (Inferred)
NFC(RB)
1 - 2.3 | S3
Slope (%) · Channel Width (m) · Riparian Class (Inferred)
— Stream Assessment Info (past assessments in purple)

2 — Site with ID

TRIT99 — Past Assessment Site with Reference Source and Year

2 — Stream Reach with ID

Stream Name
123-456000-78900
— Stream ID (Name and/or WSC and/or TWC)

- Beaver Dam
- Culvert
- VB — Velocity Barrier
- Ground Flow
- 2 / 30 — Feature Parameters (Height (m) / Length (m))

- Highway
- Paved Roads
- Gravel Roads
- 1:20K Map Tile
- 092N.055 — 1:20K Map Tile Label
- 200 — 20 m Contours and 100 m Labels

- 01234ABCD — Proposed Cutblock with ID
- 01234ABCD — Lakes/Rivers with ID
- Wetlands

Abbreviations:

CAS	Prickly sculpin
CC	Sculpin (General)
CO	Coho salmon
CT	Cutthroat trout
DV	Dolly Varden char
FSR	Forest Service Road
KO	Kokanee
MW	Mountain whitefish
NFC	No fish captured
NS	Not sampled
RB	Rainbow trout
SK	Sockeye salmon
TRIT	Triton Environmental Consultants Ltd.
TWC	Temporary Watershed Code
WSC	Watershed Code